

DEODORIZING ELEMENT AND DEODORIZING DEVICE USING THE ELEMENT

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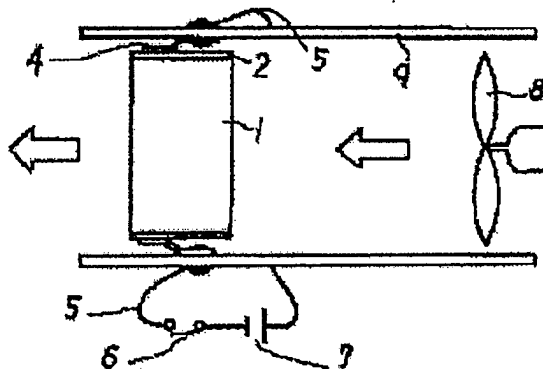
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Abstract of JP7060116

PURPOSE:To obtain a deodorizing element of simple structure having an everlasting high deodorizing effect and with the adsorptivity efficiently restored by forming the element from a honeycomb structure consisting essentially of a conductive ceramic, coating the inner surface with an oxidation catalyst and providing an electrode of metallic film on the outer surface. **CONSTITUTION:**The air contg. malodor is passed through the honeycomb of a deodorizing element 1, and the malodorous component is adsorbed by an adsorbent on the inner surface and removed. However, the adsorbent is broken through and deteriorated just like the activated carbon adsorbing a fixed amt. of malodor. At this time, a fixed voltage is applied between the electrodes of metallic film, hence a current flows in the honeycomb consisting of a conductive ceramic, the honeycomb is heated by the Joule heat, the adsorbed malodor is desorbed, the malodor is oxidized and decomposed by the oxidation catalyst on the inner surface and removed. Consequently, the malodor introduced from the outside is oxidized and decomposed by the heated catalyst and removed.



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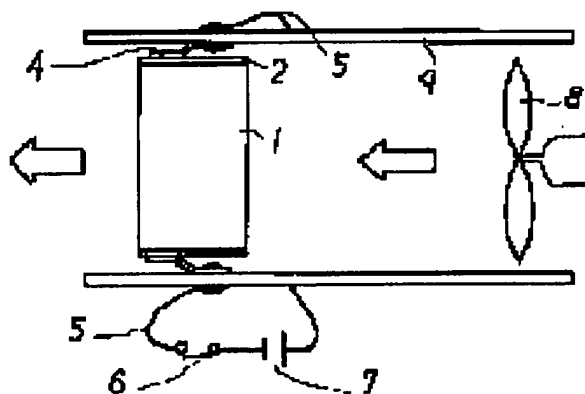
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(54) DEODORIZING ELEMENT AND DEODORIZING DEVICE USING THE ELEMENT

(57)Abstract:

PURPOSE: To obtain a deodorizing element of simple structure having an everlasting high deodorizing effect and with the adsorptivity efficiently restored by forming the element from a honeycomb structure consisting essentially of a conductive ceramic, coating the inner surface with an oxidation catalyst and providing an electrode of metallic film on the outer surface.

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CLAIMS

[Claim(s)]

[Claim 1]A deodorizing device, wherein one pair of electrodes which electrically conductive ceramics are used as the main ingredients, honeycomb structure which has many breakthroughs is comprised, and adsorption, and adsorption material and an oxidation catalyst for carrying out oxidative degradation are covered by the internal surface in a bad smell, and become the outside surface from a metallic film are provided.

[Claim 2]The deodorizing device according to claim 1, wherein said honeycomb structured body is a rectangular parallelepiped.

[Claim 3]Claim 1, wherein said one pair of electrodes are provided in a parallel outside surface to a breakthrough, or the deodorizing device according to claim 2.

[Claim 4]Claim 1 which said electrically conductive ceramics use silicon carbide and metal silicon as the main raw material, and the main ingredients consist of silicon carbide and nitrogen silicon by reaction sintering with nitrogen, and is characterized by being porosity, or the deodorizing device according to claim 2 or 3.

[Claim 5]A deodorization apparatus being able to establish an external power for installing said deodorizing device in an inside of a forced draft air duct which has a fan, and being impressed by this deodorizing device.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the deodorizing device used for a toilet, a septic tank, a shoe cupboard, a cooking device, etc., and the deodorization apparatus using the deodorizing device.

[0002]

[Description of the Prior Art] Activated carbon, a zeolite type, an ozone type, drugs, etc. are one of those are generally used as this conventional kind of a deodorizing device.

[0003] Said activated carbon and a zeolite type have honeycomb shape, fibrous felt, and which granular thing, and all contact a bad smell to this activated carbon by air blasting, and carry out physical adsorption of the stinking molecule to the fine pores of activated carbon, and they deodorize them. Said ozone type comprises a high voltage generating machine, OSONAIZA, and an ozone degradation catalyst, By impressing high voltage voltage to OSONAIZA and causing corona discharge, ozone is generated and it deodorizes by processing ozone and the bad smell which carried out oxidative degradation of the odor component, and remained after that for this ozone with the catalyst of a manganese dioxide system. And in said drugs, a nonwoven fabric etc. are usually impregnated with alkalinity or an acid aqueous salt, each bad smell is contacted to this, and it deodorizes by neutralization reaction.

[0004]

[Problem(s) to be Solved by the Invention] There was a problem as shown below in a deodorizing device conventionally [above].

[0005] Namely, there is a life in activated carbon and drugs, when fixed time use is carried out, there is a problem that it is necessary to certainly exchange, and an ozone type, It was the problem that the part deliverance smell effect over the bad smell of fatty acid systems, such as isovaleric acid by which there is a problem that a high voltage generating machine, OSONAIZA, and an ozone degradation catalyst are generally needed, structure becomes complicated, and cost becomes high, and it is generated in a shoe cupboard etc., and acetic acid, was inferior.

[0006]

[Means for Solving the Problem] Adsorption material which this invention is what solved the above problems, and creates honeycomb structure with electrically conductive ceramics, and adsorbs a bad smell at ordinary temperature at the internal surface, If an oxidation catalyst for carrying out [bad smell] oxidative degradation at the time of heating is mixed, and it is covered and voltage is impressed to an outside surface of this honeycomb structured body, it will come to provide an electrode of a couple for carrying out self-generation of heat. [0007]

[Function] The adsorption material from which this invention is covered with said composition by the inner surface which makes a honeycomb ventilate the air which includes a bad smell at ordinary temperature carries out adsorption deodorization of this odor component. However, if adsorption material adsorbs a certain fixed amount of bad smells, like activated carbon, a breakthrough will be carried out and deodorizing performance will fall. If fixed voltage is impressed to inter-electrode [said] at this time, current will flow into the honeycomb which comprises electrically conductive ceramics, it will be heated by Joule heat, and the adsorbed bad smell will be desorbed, but the oxidation catalyst heated simultaneously carries out [bad smell / this] oxidative

degradation, and makes it no odor. Simultaneously, the adsorption material which was carrying out the breakthrough returns to the original active state. At the time of heating, from the outside, oxidative degradation of the bad smell sent in is carried out by operation of the heated oxidation catalyst, and it is deodorized.

[0008] Thus, by this invention, to activated carbon, zeolite, and drugs, if, it is maintenance free (exchange needlessness of deodorization material), and to an ozone type, if, the deodorizing device of low cost can be provided. The deodorization apparatus of low cost can be provided with an easy structure by putting the external power for carrying out voltage impressing to blast system structure and an element together.

[0009]

[Example] Hereafter, the example of this invention is described based on an accompanying drawing.

[0010] Drawing 1 is an outline view of the honeycomb shape deodorizing device of this invention, in drawing 1, 1 is a deodorizing device and 2 is an electrode. Drawing 2 is an enlarged drawing of the honeycomb part of the deodorizing device of drawing 1, and, as for 1a, as for a cell (breakthrough) and 1b, a rib and 3 are deodorization film layers in drawing 2. The zeolite in which the deodorization film layer 3 has a deodorizing function by an adsorbing action at the time of ordinary temperature, the oxidation catalyst of manganese dioxide for carrying out oxidative degradation of adsorption material, such as sepiolite, alumina, and silica, and the ingredient stinking at the time of heating, a perovskite type metallic oxide, the platinum metal of alumina support, etc. and the alumina sol as a binding material, and silica -- it comprises sol etc.

[0011] In the above composition, although continued by adsorbing [the adsorption material in the deodorization film layer 3] the odor component which passes the cell 1a by air blasting at the time of ordinary temperature, with the passage of time, a breakthrough is reached and the function falls gradually. If voltage is impressed between the electrodes 2 at this time, current will flow into the rib 1b and Joule heat will arise.

[0012] And the oxidation catalyst included in the deodorization film layer 3 is also heated simultaneously, oxidative degradation of the odor component by which adsorption material was adsorbed, or the odor component which passes the cell 1a will be carried out, and it will deodorize, and simultaneously, adsorption material returns to the state of a basis and an adsorbing function recovers it. In this case, as proper heating conditions for the deodorizing device 1, it is 2 to 10 minutes at around 300 **. Thus, the deodorizing device 1 of this invention will have a deodorizing function permanently by energizing periodically.

[0013] The rectangular parallelepiped is most suitable in order to energize like this invention, although there are circular, a polygon, a rectangular parallelepiped, etc. as outline shape of the honeycomb as a deodorizing device.

An electrode is easy, moreover, forming in the parallel field which faces to a breakthrough can pass a uniform electrode to the whole deodorizing device, and it can heat it uniformly to it.

[0014] Since the porous ceramics which consist of silicon carbide and silicon nitride have adsorption performance also in this very thing, the electric conduction ceramics which constitute a deodorizing device raise the deodorizing performance of an element. Catalyst support is good and the thermal shock nature by heating of the return to wind is

excellent. This is described in detail by JP,4-132662,A which is a previous patent by this invention person. An electrode is usually formed by a thermally sprayed film or silver paste coats, such as aluminum and nickel, etc.

[0015]Drawing 3 is a deodorization apparatus using the deodorizing device 1 of this invention.

In drawing 3, the deodorizing device 1 is installed in the inside of the ventilation flue 9, and is being fixed to the ventilation flue 9 with the terminal 4 for ventilation.

The terminal 4 is connected with the external power 7 and the switch 6 via the lead 5.

[0016]The fan (fan) 8 is simultaneously installed in ventilation flue 9 inside, and non-bromination of the odor component which ventilates the deodorizing device 1 is deodorized and carried out by the deodorizing device 1 by sending in the air which contains an odor component in the deodorizing device 1 now. And it becomes a deodorization apparatus which has a deodorizing function permanently by the switch's 6 using the deodorizing device 1 according to a room temperature condition by release, usually connecting the switch 6 periodically, and energizing to the deodorizing device 1.

[0017]Drawing 4 is a graph which shows the deodorizing effect of ammonia using the deodorization apparatus of drawing 3.

[0018]The deodorizing rate which is a ratio of the ammonia concentration after deodorization of on drawing 4 and as opposed to the ammonia concentration before deodorization in a vertical axis, A horizontal axis is space velocity which is a value which broke the air capacity per hour by volume of the deodorizing device, and shows the deodorizing rate over the space velocity of the deodorizing device which uses three kinds (as for 180 cells, A and 300 cells show B and 400 cells by C) of honeycombs. The ammonia concentration before deodorization is 28 ppm.

[0019]Drawing 5 uses honeycomb deodorizing device [of 180 cells], and air-capacity condition SV30000, and ammonia 80ppm with the deodorization apparatus of drawing 3, and shows the deodorizing rate over time when [of energization 2 minutes] it deodorizes repeatedly for 10 unenergized minutes. And although the deodorizing rate is falling with the passage of time at the time of no energizing, by carrying out energization for 2 minutes, it recovers and the deodorizing rate is maintaining not less than 90% of the deodorizing rate permanently again.

[0020]

[Effect of the Invention]Thus, it is the honeycomb structure of electrically conductive ceramics, and the internal-surface adsorption material and oxidation catalyst are covered with this invention, and one pair of electrodes are provided in the outside surface by it. Therefore, it has a high deodorizing effect permanently, and it is structurally easy and the deodorizing device of low cost and a deodorization apparatus are provided.

[0021]Since honeycomb structure is provided in the outside surface where an electrode is parallel to a breakthrough in the rectangular parallelepiped, electrode formation is easy, and uniform current can be sent through the whole deodorizing device when it moreover energizes. That is, the whole element can be heated uniformly and recovery of an adsorbing function can be made efficient.

[0022]And since electric conduction ceramics use silicon carbide and metal silicon as the main raw material, the main ingredients consist of silicon carbide and nitrogen silicon by

reaction sintering with nitrogen and it is porosity, The deodorizing device adhesion of the deodorization film layer covered while improving deodorizing performance, when the ceramics itself have adsorption performance moreover excelled [deodorizing device] in endurance well (catalyst support nature is good) according to the good thing of the thermal shock nature by repetition of energizing heating is obtained.

[0023]The deodorizing device of this invention is installed in the inside of the forced draft air duct which has a fan, and since it is a deodorization apparatus of structure which can be impressed to this deodorizing device by an external power, a also structurally easy and maintenance free deodorization apparatus is obtained.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]It is an appearance perspective view of the deodorizing device in one example of this invention.

[Drawing 2]It is an important section expanded sectional view of the honeycomb part of the deodorizing device of drawing 1.

[Drawing 3]It is an important section outline lineblock diagram of the deodorization apparatus in one example of this invention.

[Drawing 4]It is an explanatory view of deodorizing rate-space velocity when the deodorization apparatus in one example of this invention is used.

[Drawing 5]It is an explanatory view of deodorizing rate-time when unenergized - energization is repeated using the deodorization apparatus in one example of this invention.

[Description of Notations]

1 Deodorizing device

1a Cell

1b Rib

2 Electrode

3 Deodorization film layer

4 Terminal

5 Lead

- 6 Switch
- 7 External power
- 8 Fan
- 9 Forced draft air duct

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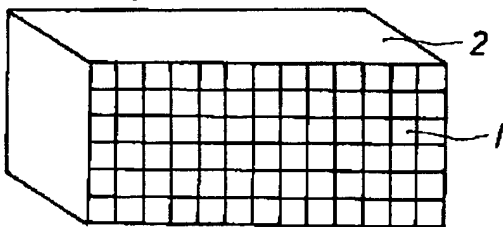
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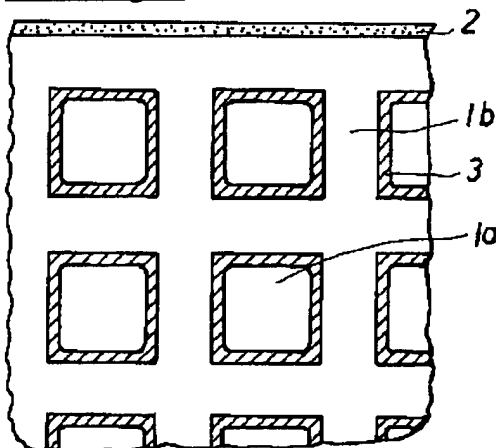
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DRAWINGS

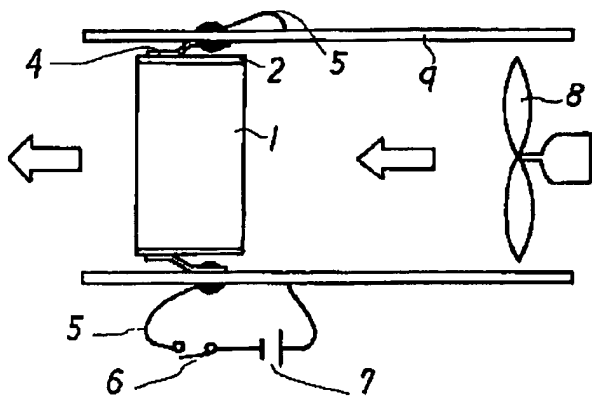
[Drawing 1]



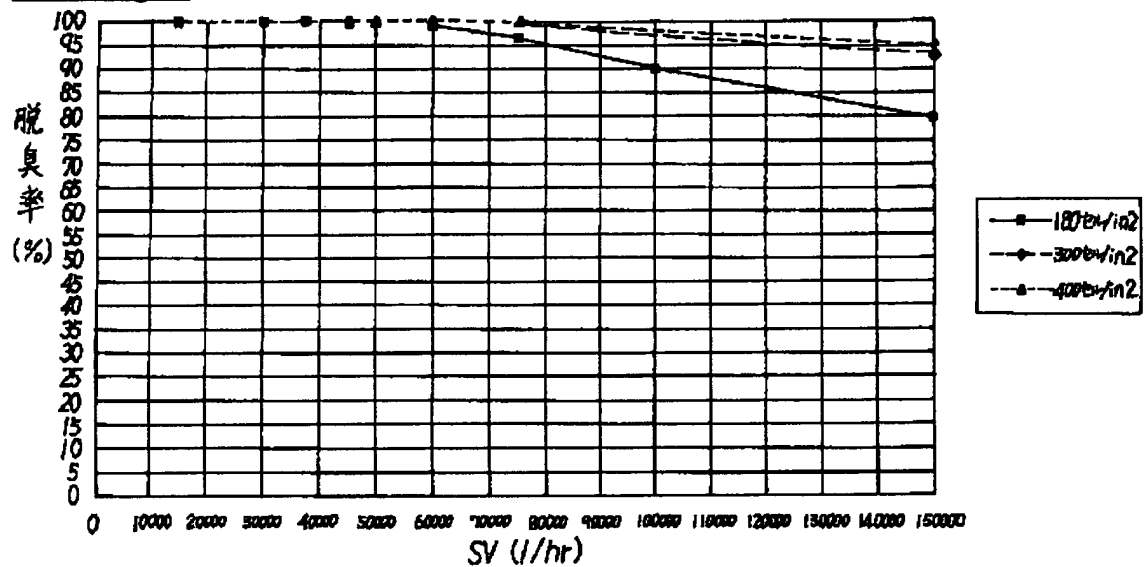
[Drawing 2]



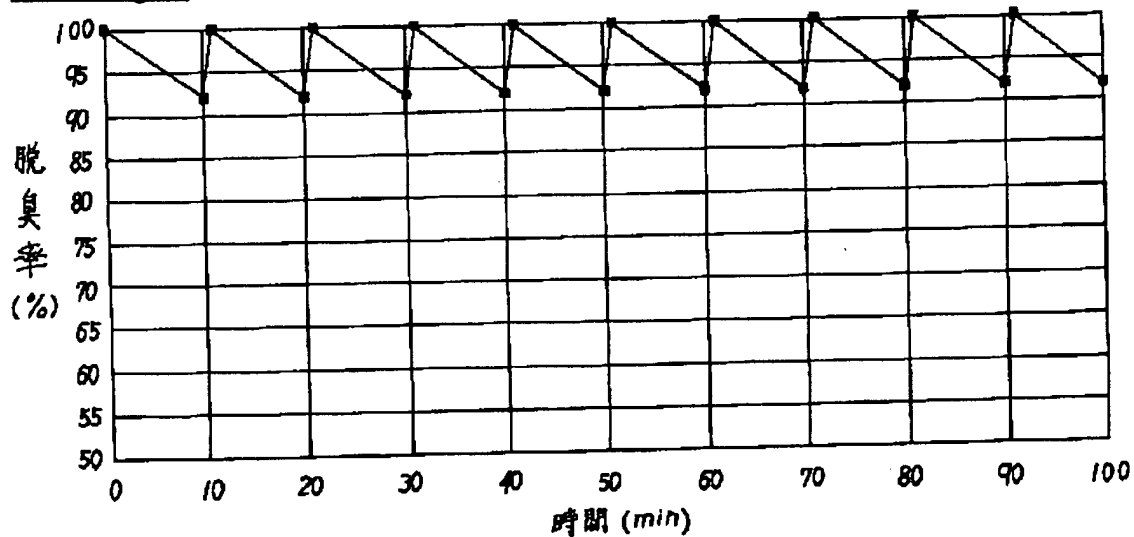
[Drawing 3]



[Drawing 4]



[Drawing 5]



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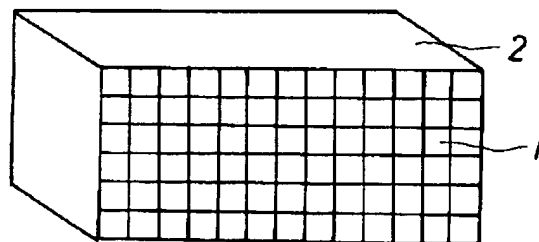
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(54) 【発明の名称】 脱臭素子及びその脱臭素子を用いた脱臭装置

(57) 【要約】

【構成】 導電性セラミックスを主成分とし、多数の貫通孔1aを有するハニカム構造から成り、その内表面には臭気を吸着及び酸化分解するための吸着剤と酸化触媒が被覆され、且つその外表面には金属皮膜からなる1対の電極2が設けられてなる脱臭素子1と、その脱臭素子1を送風路9内に設置してなる脱臭装置とよりなるものである。

【効果】 永続的に高い脱臭効果をもち、構造的にも簡単で低コストの脱臭素子及び脱臭装置が得られる。



【特許請求の範囲】

【請求項1】 導電性セラミックスを主成分とし、多数の貫通孔を有するハニカム構造から成り、その内表面には臭気を吸着及び酸化分解するための吸着材と酸化触媒が被覆され、且つその外表面には金属皮膜からなる1対の電極が設けられたことを特徴とする脱臭素子。

【請求項2】 前記ハニカム構造体が、直方体であることを特徴とする請求項1記載の脱臭素子。

【請求項3】 前記1対の電極が、貫通孔に対して平行な外表面に設けられたことを特徴とする請求項1若しくは請求項2記載の脱臭素子。

【請求項4】 前記導電性セラミックスが、炭化ケイ素と金属シリコンを主原料とし、窒素との反応焼結により主成分が炭化ケイ素と窒素ケイ素からなり多孔質であることを特徴とする請求項1若しくは請求項2又は請求項3記載の脱臭素子。

【請求項5】 前記脱臭素子を送風機を有する送風路の内部に設置し、且つこの脱臭素子に印加するための外部電源を設けられたことを特徴とする脱臭装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、トイレ、浄化槽、下駄箱、調理器などに用いられる脱臭素子及びその脱臭素子を用いた脱臭装置に関するものである。

【0002】

【従来の技術】従来のこの種の脱臭素子として一般に利用されているものとしては、活性炭、ゼオライト式、オゾン式、或は薬剤などがある。

【0003】前記活性炭やゼオライト式は、ハニカム形状、繊維状フェルト、粒状などのものがあり、いずれもこの活性炭に送風により臭気を接触させ、臭い分子を活性炭の細孔に物理吸着させて脱臭するものである。また前記オゾン式は、高圧発生機、オソナイザー、オゾン分解触媒で構成され、オソナイザーに高圧電圧を印加しコロナ放電を起こすことによりオゾンを発生させ、このオゾンで臭気成分を酸化分解し、その後残留したオゾンと臭気を2酸化マンガン系の触媒で処理することにより脱臭するものである。そして前記薬剤では、通常不織布などにアルカリ性或いは酸性水溶液を含浸させ、これにそれぞれの臭気を接触させ中和反応により脱臭するものである。

【0004】

【発明が解決しようとする課題】前記のような従来脱臭素子には、以下に示すような問題があった。

【0005】即ち、活性炭、薬剤には寿命があり一定時間使用すると必ず交換する必要があるという問題点があり、オゾン式は、一般に高圧発生機、オソナイザー、オゾン分解触媒を必要とし構造が複雑になりコストが高くなるという問題点があり、そして下駄箱などで発生するイソ吉草酸、酢酸などの脂肪酸系の臭気に対する分解脱

臭効果が劣るという問題点であった。

【0006】

【課題を解決するための手段】本発明は前記のような問題点を解決したもので、ハニカム構造を導電性セラミックスで作成しその内表面に臭気を常温で吸着する吸着材と、加熱時には臭気を酸化分解するための酸化触媒が混合して被覆されており、且つこのハニカム構造体の外表面には電圧を印加すれば自己発熱するための1対の電極が設けられてなるものである

【0007】

【作用】本発明は前記構成にて、常温で臭気を含む空気をハニカムに通風させる内面に被覆されている吸着材がこの臭気成分を吸着脱臭する。しかしながら、吸着材は、ある一定の臭気量を吸着すると活性炭と同様、破過し脱臭性能が落ちてくる。このとき前記電極間に一定の電圧を印加すると導電性セラミックスから成るハニカム内に電流が流れジュール熱により加熱され、吸着された臭気が脱着されるが同時に加熱された酸化触媒がこの臭気を酸化分解して無臭にする。同時に、破過していた吸着材は、元の活性状態に復帰する。加熱時、外部から送り込まれる臭気は、加熱された酸化触媒の作用により酸化分解して脱臭される。

【0008】このように、本発明により、活性炭、ゼオライト、薬剤にたいしてはメンテナンスフリー（脱臭材の交換不要）であり、オゾン式にたいしては低コストの脱臭素子が提供できる。また、送風系構造と素子に電圧印加するための外部電源を組合わすことにより簡単な構造で低コストの脱臭装置が提供できる。

【0009】

【実施例】以下、本発明の実施例を添付図面にもとづいて説明する。

【0010】図1は本発明のハニカム状脱臭素子の外観図であり、図1において1は脱臭素子、2は電極である。図2は図1の脱臭素子のハニカム部の拡大図であり、図2において、1aはセル（貫通孔）、1bはリブ、3は脱臭皮膜層である。脱臭皮膜層3は常温時に吸着作用により脱臭機能を有するゼオライト、セピオライト、アルミナ、シリカ等の吸着材、加熱時に臭い成分を酸化分解するための二酸化マンガン、ペロブスカイト型金属酸化物、アルミナ担持の白金族金属等の酸化触媒及び結合材としてのアルミナゾル、シリカゾル等で構成される。

【0011】前記のような構成において、送風によりセル1aを通過する臭気成分は、常温時、脱臭皮膜層3中の吸着材により吸着され続けるが、時間の経過とともに破過に達しその機能はだんだん低下する。この時、電極2の間に電圧を印加すると、リブ1bに電流が流れ、ジュール熱が生じる。

【0012】そして、脱臭皮膜層3に含まれる酸化触媒も同時に加熱され、吸着材に吸着された臭気成分やセル

1aを通過する臭気成分を酸化分解し脱臭することになり、同時に、吸着材はもとの状態に戻り吸着機能が回復する。この場合、脱臭素子1の適正な加熱条件としては、300℃前後で2～10分である。このように本発明の脱臭素子1は、定期的に通電することにより永続的に脱臭機能を有することになる。

【0013】脱臭素子としてのハニカムの外形形状としては、円形、多角形、直方体などがあるが本発明のように通電するためには、直方体が最も適しており、電極は貫通孔に対して平行な相対する面に形成することが、簡単

でしかも脱臭素子全体に均一な電極を流す事ができ、均一に加熱することができる。
【0014】また、脱臭素子を構成する導電セラミックスは、炭化ケイ素と窒化ケイ素からなる多孔質セラミックスがこれ自体にも吸着性能をもつため素子の脱臭性能を向上させる。また触媒担持がよく、繰り返しの加熱による熱衝撃性が優れている。これについては、本発明者による先願特許である特開平4-132662号公報で詳しく述べられている。また、電極は通常アルミニウムやニッケルなどの溶射皮膜あるいは銀ペースト皮膜

などで形成される。
【0015】図3は、本発明の脱臭素子1を利用した脱臭装置であり、図3において、脱臭素子1は、通風路9の内部に設置され、通風用の端子4で通風路9に固定されている。端子4はリード線5を介して外部電源7及びスイッチ6と接続されている。

【0016】通風路9内部には同時に送風機（ファン）8が設置されており、これにて脱臭素子1に臭気成分を含む空気を送り込むことにより脱臭素子1を通風する臭気成分は脱臭素子1で脱臭され無臭化される。そして通常は、スイッチ6が解放で脱臭素子1を常温状態で使用し、定期的にスイッチ6を接続して脱臭素子1に通電することにより、永続的に脱臭機能を有する脱臭装置となる。

【0017】図4は、図3の脱臭装置を使用してアンモニアの脱臭効果を示すグラフである。

【0018】図4において、縦軸は脱臭前のアンモニア濃度にたいする脱臭後のアンモニア濃度の比率である脱臭率、横軸は1時間当たりの風量を脱臭素子の体積で割った値であるSV値であり、3種類（180セルはA、300セルはB、400セルはCで示す）のハニカムを使用した脱臭素子のSV値に対する脱臭率を示している。脱臭前のアンモニア濃度は、28ppmである。

【0019】図5は、図3の脱臭装置で180セルのハニカム脱臭素子、風量条件SV30000、アンモニア80ppmを使用し、無通電10分、通電2分の繰り返し脱臭したときの時間に対する脱臭率を示している。そして、無通電時には、時間の経過とともに脱臭率は低下しているが、2分の通電をすることにより再び脱臭率は

回復し、永続的に脱臭率90%以上を維持している。

【0020】

【発明の効果】このように本発明によれば、導電性セラミックスのハニカム構造で、その内表面ら吸着材と酸化触媒が被覆され、且つ外表面に1対の電極が設けられていることにより、永続的に高い脱臭効果をもち、構造的にも簡単に低コストの脱臭素子、脱臭装置が提供される。

【0021】また、ハニカム構造が直方体で電極が貫通孔に平行な外表面に設けられているため電極形成が簡単で、しかも通電したとき脱臭素子全体に均一な電流を流すことができる。即ち素子全体を均一に加熱することができ吸着機能の回復を効率よくできる。

【0022】そして、導電セラミックスが、炭化ケイ素と金属シリコンを主原料とし、窒素との反応焼結により主成分が炭化ケイ素と窒素ケイ素からなり多孔質であるため、セラミック自身も吸着性能をもつ事により脱臭性能を向上するとともに被覆する脱臭皮膜層の密着がよく（触媒担持性がよい）、しかも通電加熱の繰り返しによる熱衝撃性のよい事により耐久性の優れた脱臭素子が得られる。

【0023】更に、本発明の脱臭素子を送風機を有する送風路の内部に設置し、この脱臭素子に外部電源により印加できる構造の脱臭装置であるため、構造的にも簡単にメンテナンスフリーの脱臭装置が得られる。

【図面の簡単な説明】

【図1】本発明の一実施例における脱臭素子の外観斜視図である。

【図2】図1の脱臭素子のハニカム部の要部拡大断面図である。

【図3】本発明の一実施例における脱臭装置の要部概略構成図である。

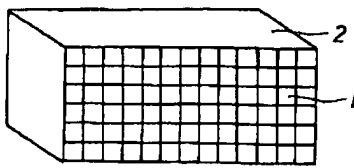
【図4】本発明の一実施例における脱臭装置を使用したときの脱臭率-SV値の説明図である。

【図5】本発明の一実施例における脱臭装置を使用し無通電-通電の繰り返しを行った時の脱臭率-時間の説明図である。

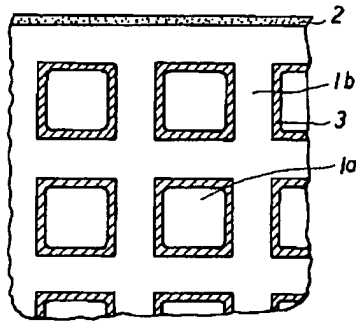
【符号の説明】

- | | |
|----|-------|
| 1 | 脱臭素子 |
| 1a | セル |
| 1b | リブ |
| 2 | 電極 |
| 3 | 脱臭皮膜層 |
| 4 | 端子 |
| 5 | リード線 |
| 6 | スイッチ |
| 7 | 外部電源 |
| 8 | 送風機 |
| 9 | 送風路 |

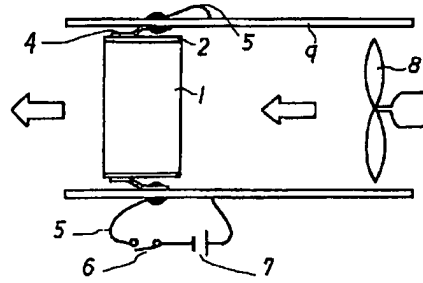
【図1】



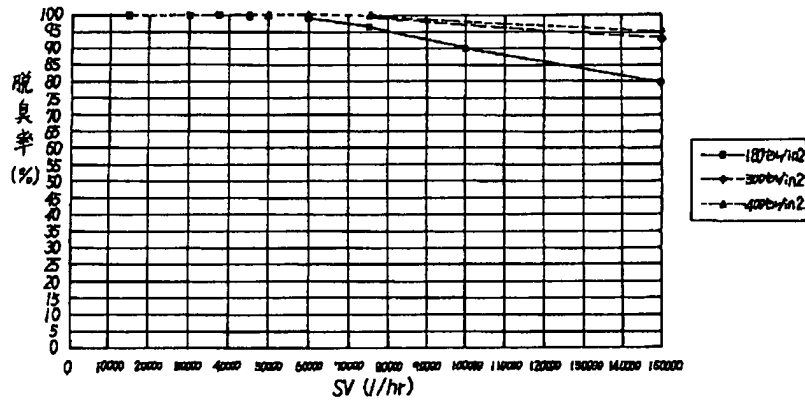
【図2】



【図3】



【図4】



【図5】

